

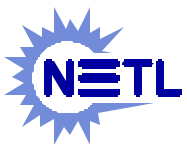
# Natural Gas Infrastructure Reliability



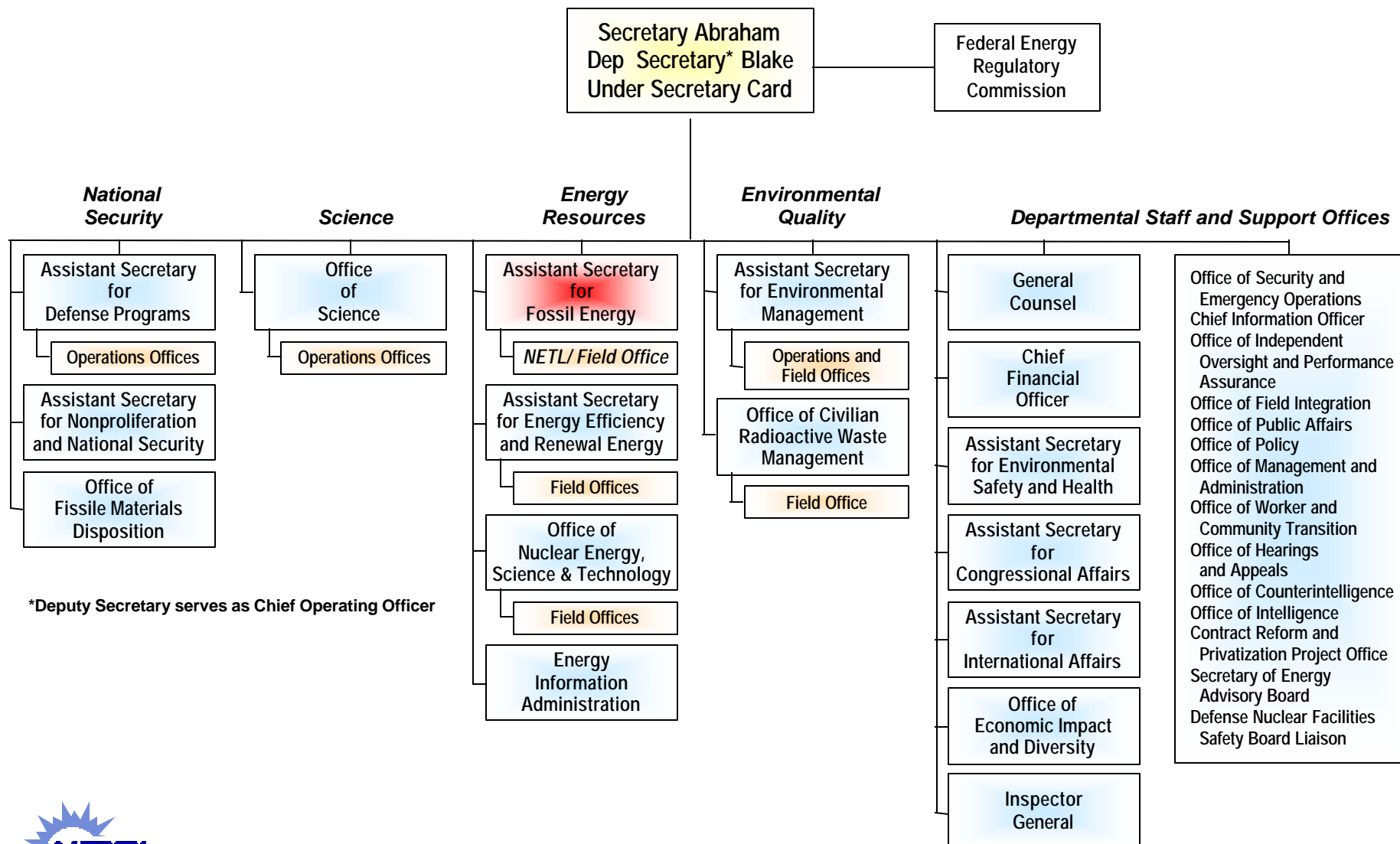
*Program Overview*

*Dr. Rodney J. Anderson*  
*Product Manager*

**Strategic Center for Natural Gas**



# Department of Energy



\*Deputy Secretary serves as Chief Operating Officer



*Strategic Center for Natural Gas*

# What NETL Is

Industry Focussed

## What We Are

One of DOE's 15 National Laboratories: December, 1999  
Government Owned and Operated  
Morgantown, WV, Pittsburgh, PA, and Tulsa, OK

## What We Do

Shape, fund, and manage extramural RD&D programs  
Conduct on-site science and technology research  
Conduct analyses to support policy development

## Mission

Provide Americans with a stronger economy, healthier environment, and more secure future by resolving the environmental, supply, and reliability constraints of producing and using fossil resources

### ■ Nearly 700 research activities in all 50 states and 16 countries

- Private Industry
- Universities/colleges
- Not-for-profit laboratories
- DOE National Laboratories
- Other government laboratories

• FY01 Budget of \$722 Million

### • Strategic Center for Natural Gas

### ■ 550 Federal Employees

- Technical Management
- In-House R&D
- Administration
- E&E technical & business services

### ■ 608 Support Contractors

- 480 On-Site
- 128 Off-Site



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# Strategic Center for Natural Gas

## ***Vision:***

By 2020, U.S. public is enjoying benefits from an increase in gas use:

- Affordable supply
- Reliable delivery
- Environmental protection



## ***Mission:***

Be the focal point for an integrated gas program:

- Spearhead annual DOE-wide gas RD&D planning and program assessment
- Provide science and technology advances through NETL's on-site programs
- Shape, fund, and manage extramural RD&D
- Conduct studies to support policy development





# Gas Infrastructure Reliability



- **New DOE Initiative that builds on NETL's existing gas storage program**
- **Infrastructure includes: transmission, distribution & storage**
- **Program goals are:**
  - Maintain/enhance system reliability and integrity
  - Increase gas deliverability
  - Reduce environmental impact
  - Compliment interdependencies between gas & electric systems
  - Develop technological foundation for future gas delivery system
- **FY01 funding:**
  - \$3 million storage technology
  - \$5 million infrastructure systems reliability





# Infrastructure Goals

- Provide research and technology development to ensure domestic natural gas infrastructure system reliability, flexibility, and integrity
- Establish the technology framework for our Nation's future natural gas transportation and delivery system
- Focus federal infrastructure program on public benefit R&D
- Collaborate with private sector to develop new technologies and practices to enhance operations of gas infrastructure



## Core Areas & Issues

- **Pipelines and distribution systems**

- Third-party damage
- Integrity Assessment
- Leak detection
- Guided boring technology
- Underground facility location
- Compressor technology
- Aging pipeline and distribution systems
- Growth of distributed power
- Internal pipe inspection/repair
- System automation and control

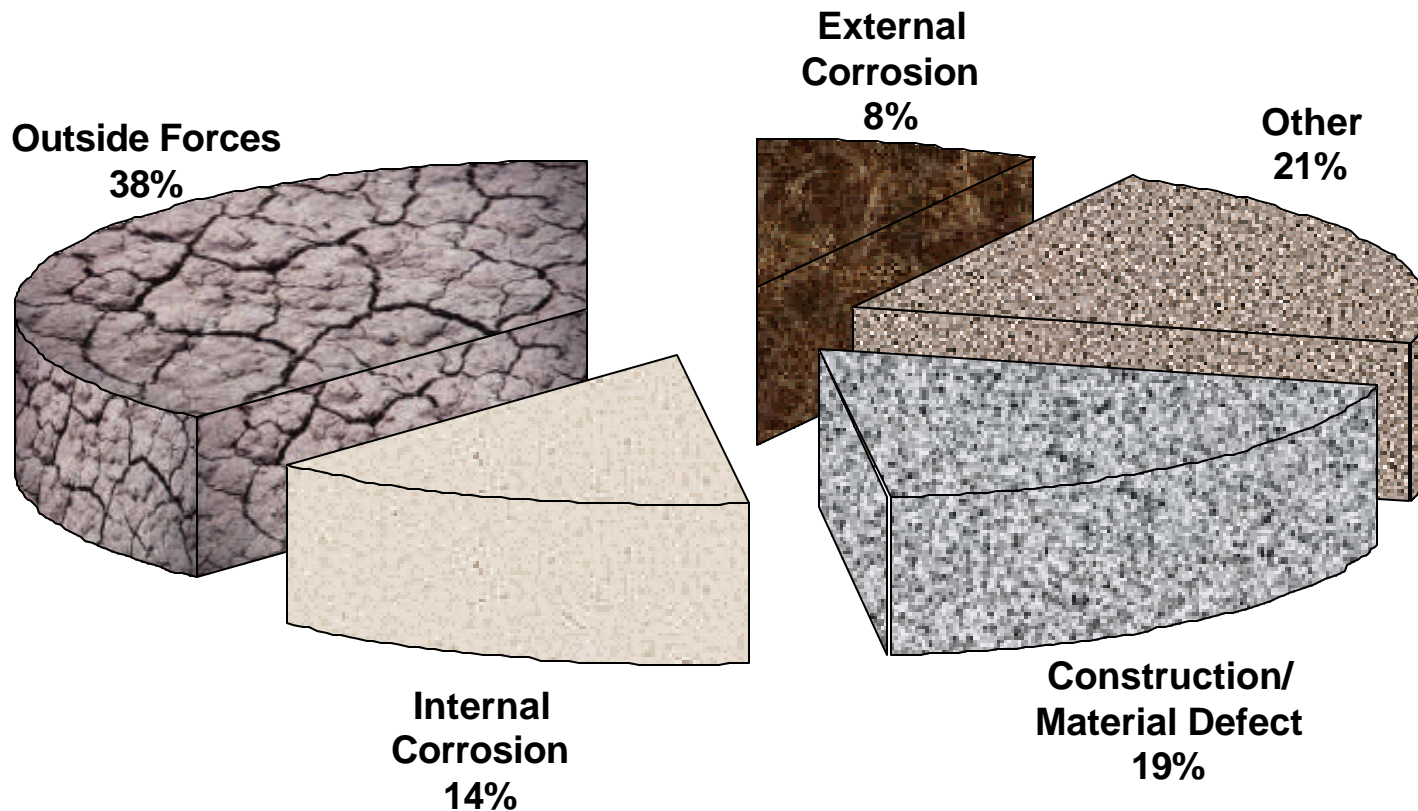
- **Environmental**

- Environmental impact
- Federal permitting process



# Causes of Pipeline Accidents

***Total Number of Natural Gas Transmission Pipeline Accidents, by Cause 1998***



Source: Office of Pipeline Safety, US DOT

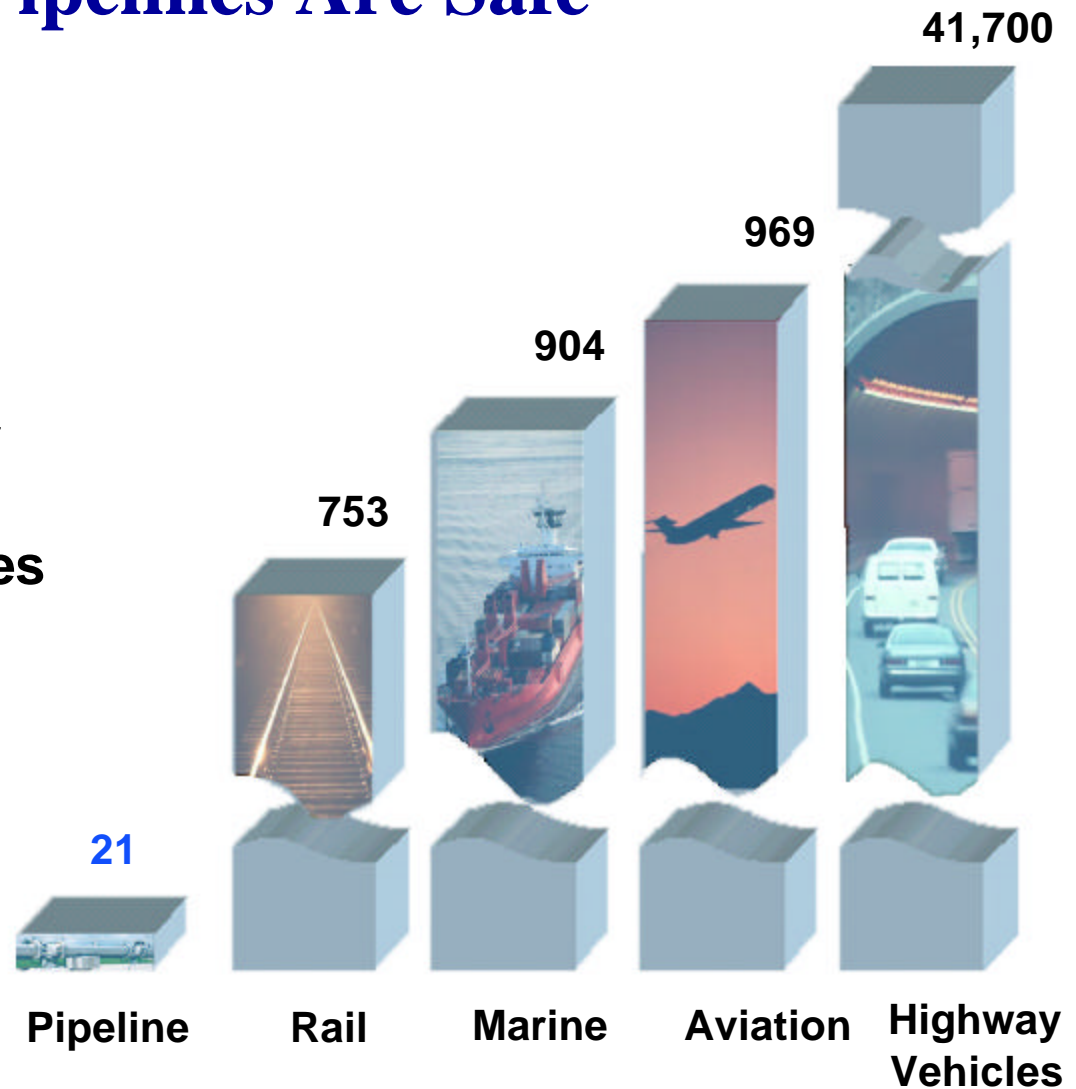


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# Gas Pipelines Are Safe

National Transportation Safety Board statistics show the pipeline industry to be the safest in the country in terms of fatalities per year



Source: NTSB, 1995



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# Infrastructure Setting

- ✓ Gas demand to increase by 60% (to 35 tcf) by 2020 \*
- ✓ Electric generators demand for natural gas to triple (grow by 8 tcf \*)
- ✓ Aging infrastructure inadequate to meet future demand
- ✓ Consolidation and competition limits gas industry investment in long-term public benefit R&D
- ✓ Distributed power will require infrastructure changes
- ✓ Gas is *critical* for U.S. climate change strategies
- ✓ Increasing environmental sensitivities



\*Annual Energy Outlook 2001

*Strategic Center for Natural Gas*

# FY01 Infrastructure Activities

## Interagency Workshop

March 22 & 23, Washington, DC  
DOE, DOT, FERC, EPA, DOI

## Visioning Workshop

May 3, Pittsburgh, PA  
15 industry executives

## Roadmapping Workshop

June 6 & 7, St. Louis, MO  
40 industry experts

## Competitive Solicitation

11 Projects Selected  
Multiple awards  
Various stages of development

## Goals

- \$ Elicit stakeholder input
  - Vision
  - Technology needs & opportunities
- \$ Determine government role

## National Lab Call

9 Projects Selected  
Multiple Labs  
Focus on Innovation

## Broad-Based Financial Assistance

10 Projects Selected  
Multiple Awards  
Various stages of development



# Roadmapping Workshop Results

## R&D Timeframe

### Near Term

- Locatable Plastic Pipe
- Laser Methane/ethane Detectors
- Imaging and locating underground pipes
- Improve the permitting process

### Mid Term

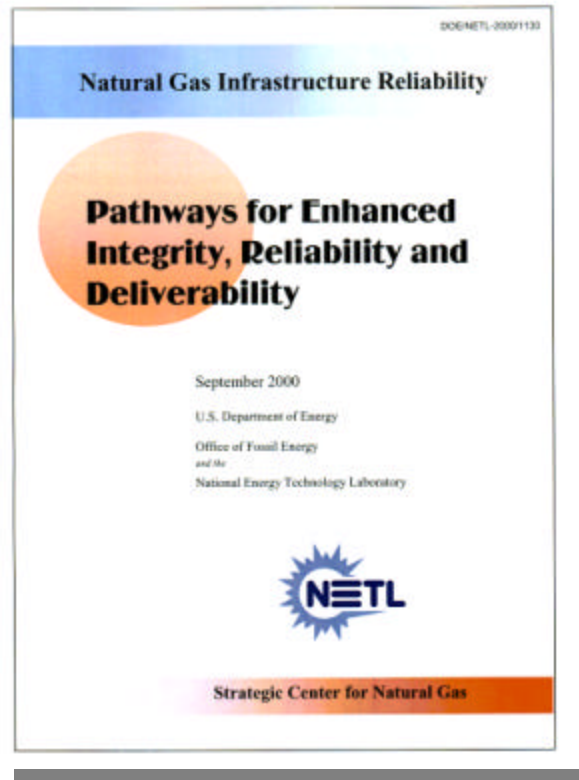
- Sensor on guided boring tool
- More sophisticated underground directional drilling
- Warning system on excavation equipment
- Integrity assessment
- New composite materials

### Long Term

- Intrusion detection device
- 3-D subsurface facility locating techniques
- Multi-functional sensors (residual life, third party damage, & mapping)
- High pressure composite transmission pipe



# Roadmap Final Report



Available on the SCNG Website at:

[www.netl.doe.gov/scng/publications/naturalg.pdf](http://www.netl.doe.gov/scng/publications/naturalg.pdf)



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## Collaborations

- **Gas Industry**
  - All
    - Project participation, proposal and project review
- **Natural Gas Organizations**
  - AGA, APGA, GMRC, INGAA, NYGAS, PRCI, etc
    - Stakeholder input, communication channel for products, cost share
- **R&D Organizations**
  - GTI, Battelle, SwRI, National Labs, universities, etc
    - Project participation, innovation, technical issues
- **Federal**
  - DOT/OPS
    - share experience, cost share, joint strategy



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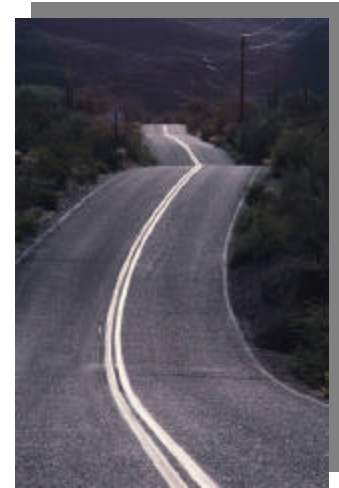
# Implementation Strategy

- **Balanced R&D program**
  - distribution, transmission, & crosscuts
- **Most funding dedicated to private sector projects**
- **National laboratory efforts focused on innovation**
- **Industry participation**
  - Projects
  - Project review
  - Proposal review
  - Roadmap Update
- **Collaborations & cost sharing**
- **Focus on high risk, innovation, and leap frog technologies**
- **Some quick wins to demonstrate progress**

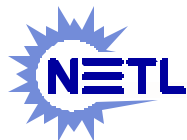
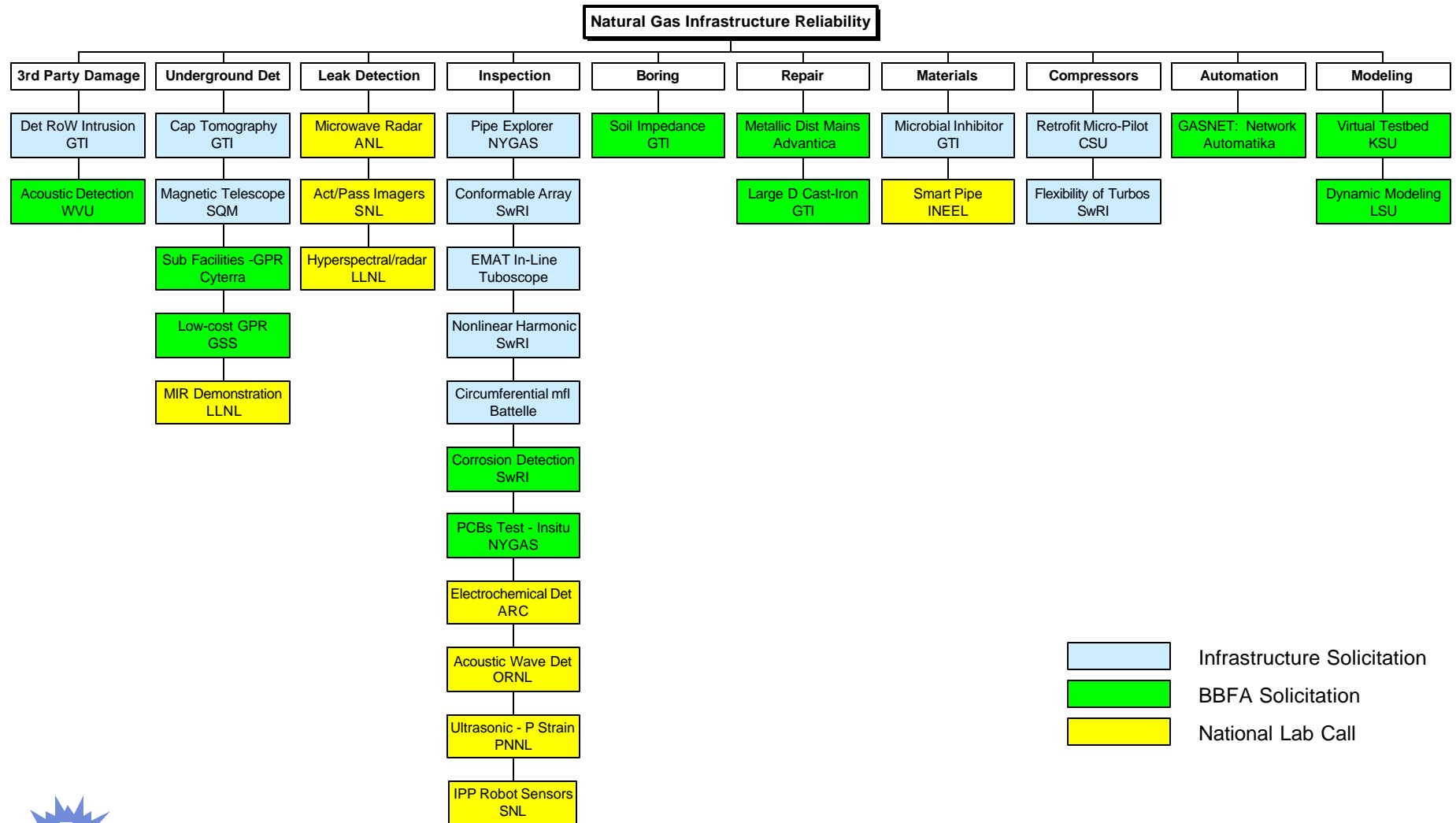


## Status

- **Following Roadmapping results!**
- **Talking with industry**
- **Establishing collaboration with DOT**
- **30 selected for funding in FY01**
  - Competitive solicitation
    - 11 projects selected, multiple awards, various stages of development
  - Broad-Based Financial Assistance solicitation
    - 10 projects selected, multiple awards, various stages of development
  - National Lab call
    - 9 projects selected, multiple labs, focus on innovation



# Project Portfolio



# R&D Project Matrix

<i>Area</i>	<i>Level</i>
Third Party Damage	<input type="radio"/>
Underground Detection	<input checked="" type="radio"/>
Leak Detection	<input type="radio"/>
Internal/External Inspection	<input checked="" type="radio"/>
Boring Technologies	<input type="radio"/>
Repair Technologies	<input type="radio"/>
Materials	<input type="radio"/>
Compressor Technologies	<input type="radio"/>
Automation	<input type="radio"/>
Modeling	<input type="radio"/>

<i>Activity Legend</i>	
<input checked="" type="radio"/>	Strong
<input checked="" type="radio"/>	Adequate
<input checked="" type="radio"/>	Moderate
<input type="radio"/>	Minimal
	None





# Recent Articles



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## **FY02 Planned Activities**

- **Formalize collaboration with DOT/OPS**
- **Complete awards for initial 30 projects**
- **Hold contractors review meeting (February)**
- **Update Natural Gas Infrastructure Roadmap**
- **Release new solicitation based on revised roadmap (March)**
- **Award additional R&D contracts**
- **Evaluate options for 2 university consortia**
- **Maintain a strong R&D infrastructure in the US**





# NATIONAL ENERGY TECHNOLOGY LABORATORY

## STRATEGIC CENTER FOR NATURAL GAS

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### *The Strategic Center for Natural Gas*

#### Methane Hydrates Solicitation

The Strategic Center for Natural Gas is seeking applications for the solicitation titled, "Methane Hydrates". The closing dates for submission of proposals is April 24, 2001. [Read More!](#)

#### Honeywell Hybrid Fuel Cell Tech. To be Added to DOE/SCNG R&D Program

DOE has selected Honeywell International to begin developing a new type of "planar solid oxide fuel cell" hybrid power system. [Read More!](#)

#### Lasers Studied for 21st Century Oil, Natural Gas Drilling

DOE and the natural gas industry are exploring whether lasers could be the next revolutionary advance in oil and gas drilling. [Read More!](#)

*Integrating All Elements of DOE's  
Natural Gas Research  
From Borehole to Burner Tip*

Strategic Planning & Policy Support

Exploration and Production

Transmission, Distribution & Storage

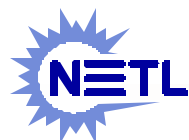
Gas Processing & End Use

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U.S. Department of Energy



**Internet Location:** [netl.doe.gov/scng/index.html](http://netl.doe.gov/scng/index.html)

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